

## EVALUATION OF EXPERIMENTAL VACCINATION OF WHITE PEKIN DUCKS (*ANAS PLATYRHYNCHOS*) AGAINST NEWCASTLE DISEASE

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### ABSTRACT

This study aimed the characterization of the importance of vaccination against Newcastle disease of white Pekin duck (*Anas platyrhynchos*). There were used 120 Pekin ducks, distributed at random into 4 groups, vaccinated or not. At 60 days of age, all groups were challenged with a pathogenic virus (NDV) suspension,  $EID_{50} = 10^{8.15}/0.1$  mL and a group of Specific Pathogen Free (SPF) chicks were used as control of the virus. Cloacal and tracheal swabs from each bird were collected after 6, 14, 20 and 30 days post-challenge for viral isolation in SPF embryonated eggs. White Pekin ducks of all groups did not demonstrate symptoms of the Newcastle Disease (ND). They were refractory to the ND clinical disease. In Pekin ducks from control group, the viral isolation was obtained from 20 up to 30 days after challenge. The NDV isolation was possible in 100% of SPF chicks that died after challenge with ND clinical signs, suggesting the possible state of carrier of NDV by Pekin ducks. In vaccinated groups, the viral isolation was null. It was also demonstrated therefore the relevance of the vaccination to control the virus dissemination by white Pekin ducks infected with NDV.

KEY WORDS: Pekin duck, *Anas platyrhynchos*, Newcastle Disease, NDV carrier, vaccination.

### RESUMO

ESTUDO DA VACINAÇÃO EXPERIMENTAL DE MARRECO DE PEQUIM (*ANAS PLATYRHYNCHOS*) CONTRA A DOENÇA DE NEWCASTLE. O objetivo do trabalho foi estudar a importância da vacinação de marreco de Pequim (*Anas platyrhynchos*) contra a Doença de Newcastle (DN). Foram utilizados 120 marreco, distribuídos aleatoriamente em 4 grupos, vacinados ou não. Aos 60 dias de idade, todos os grupos foram desafiados com uma suspensão de vírus patogênico (VDN),  $EID_{50} = 10^{8.15}/0,1$  mL e um grupo de aves livres de patógenos específicos (SPF) foi utilizado como controle do vírus. Suabes cloacais e traqueais foram colhidos após 6, 14, 20 e 30 dias após o desafio para isolamento viral, realizado em ovos embrionados SPF. Os marreco de Pequim de nenhum dos grupos demonstraram sinais clínicos da DN, mostrando-se refratários à doença clínica. Nos marreco do grupo controle, o isolamento viral foi positivo de 20 até 30 dias após o desafio, sugerindo o possível estado de portador do VDN pelos marreco de Pequim. Foi realizado o isolamento viral em 100% das aves SPF, que apresentaram sinais clínicos e vieram a óbito após o desafio com o VDN. Nos grupos vacinados, o isolamento do VDN foi nulo. Tais dados demonstraram a importância da vacinação para o controle da disseminação do vírus pelos marreco de Pequim infectados pelo VDN.

PALAVRAS-CHAVE: Marreco de Pekin, *Anas platyrhynchos*, Doença de Newcastle, estado de portador, vacinação.

### INTRODUCTION

Newcastle Disease (ND) remains as the most important poultry virosis with highly infectious ability,

affecting domestic and wild birds. Routine vaccination combined with sacrifice of affected birds has helped to control the very virulent disease caused by the ND virus (NDV), classified as *Avian Parainfluenzavirus*

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type 1. Newcastle disease has been the main sanitary barrier for the free commerce of birds and its products between countries (OFFICE INTERNATIONAL DES EPIZOOTIES, 1996). At the moment, the disease has a world-wide distribution with a large rank of hosts, in which 27 of the 50 orders of birds have been reported like infected by this etiologic agent (KALETA; BELDAUF, 1988). In this context, there is the specie white Pekin duck, whose, commercial raising aims to the meat with high nutritious value, comes developing in Brazil. This increase in production of white Pekin duck may be due to its potential of economic return. These animals are easily adaptable to poultry raising conditions, with elevated production potential; however, until the present moment, studies about the sanitary control have not been made. In this way, the intensive raising, movement and the increase of these birds concentration may facilitate the dissemination of the NDV. Therefore, this investigation had the objective to study the importance of the vaccination in this species against Newcastle disease, and also to investigate the state of NDV carrier of the Pekin duck.

## MATERIAL AND METHODS

**Experimental birds and management:** A total number of 120 day-old white Pekin ducks were distributed into four treatments of 30 birds each, as shown in Table 1. Each group was divided into three repetitions with 10 Pekin ducks each, housed in boxes over litter, keeping distance between the other groups. White Pekin ducks nutrition was based on an equilibrated diet for each different growth phase.

**Vaccines:** Recently manufactured live NDV vaccines were applied to each experimental group according to PAULILLO (1980, 1984 and 1989), PAULILLO *et al.* (1982), PAULILLO *et al.* (1987) and PAULILLO *et al.* (1996). Vaccines titer was obtained by determining 50% of the embryo-infecting dose in embryonated eggs of specific pathogen free breeders at 8 and 10 days of incubation. The titers of the live vaccines with strains Ulster 2C, B1 and LaSota were  $7.15 \log_{10}/0.1\text{mL}$ ,  $7.2 \log_{10}/0.1\text{mL}$  and  $7.35 \log_{10}/0.1\text{mL}$ ,

respectively. Birds from groups G1, G2 and G3 were vaccinated at seven days and revaccinated at 29 days of age.

Table 1 - Distribution of the white Pekin duck in experimental groups.

| Group | Vaccination (7 days) | Administration route | Revaccination intra-conjunctiva a route (29 days) |
|-------|----------------------|----------------------|---|
| G1    | Ulster 2C            | Intra-conjunctiva    | Ulster 2C   |
| G2    | B1                   | Intra-conjunctiva    | B1  |
| G3    | LaSota               | Intra-conjunctiva    | LaSota  |
| G4    | Control              | -                    | -   |

**Challenge:** At 60 days of age, 12 white Pekin ducks from each treatment (four per repetition) were challenged with viscerotropic ND virus strain. The virus had intra-cerebral pathogenicity index of 1.78 and the embryonic death time was 48 hours, with a 50% embryo infecting dose titer of  $8.15 \log_{10}/0.1\text{mL}$ . Distilled water was used as diluent for the inoculum that was instilled by oculo-nasal rout, according to the U.S. CODE OF FEDERAL REGULATIONS (1993). In order to measure the pathogenicity of the NDV challenge strain, a group of 12 Specific-Pathogen-Free (SPF) chicks were used. The birds were housed in isolators with filtered air and offered food and water *ad libitum*.

**Virus isolation:** At six, 14, 20 and 30 days post-challenge, tracheal and cloacal swabs were collected from all birds of each group to carry out virus isolation, according to methodology of REED ; MUNCH (1938).

## RESULTS AND DISCUSSION

Data about the challenge with viscerotropic velogenic NDV in white Pekin ducks are shown in Table 2. None of the Pekin duck groups, vaccinated or not, presented any sign of ND after challenge, which is consistent with the observations of HIGGINS (1971). On the other hand, 100% of the SPF broilers died due to the NDV challenge. Three days after challenge, the

Table 2 - Results of challenge with velogenic viscerotropic Newcastle Disease virus in white Pekin ducks at 60 days of age.

| Group | Vaccination (7 days) | Administration route | Revaccination intra-conjunctiva (29 days) | Number of birds | %Total protection |
|-------|----------------------|----------------------|---|-----------------|-------------------|
| G1    | Ulster 2C            | Intra-conjunctiva    | Ulster 2C                                 | 12              | 100.0             |
| G2    | B1                   | Intra-conjunctiva    | B1  | 12              | 100.0             |
| G3    | LaSota               | Intra-conjunctiva    | LaSota                                    | 12              | 100.0             |
| G4    | Control              | -                    | -   | 12              | 100.0             |
| G5    | SPF chicks           | -                    | -   | 12              | 0.0               |

Table 3 - Results of virus (NDV) isolation from white Pekin ducks (60 days of age) after challenge.

| Group | Vaccination<br>(7 days) | Revaccination intra-<br>conjunctiva route (29 days) | Viral isolation |   |        |   |        |   |        |   |
|-------|-------------------------|---|-----------------|---|--------|---|--------|---|--------|---|
|       |                         |   | 6 DAC           |   | 14 DAC |   | 20 DAC |   | 30 DAC |   |
|       |                         |   | T               | C | T      | T | C      | T | T      | C |
| G1    | Ulster 2C               | Ulster 2C   | -               | - | -      | - | -      | - | -      | - |
| G2    | B1                      | B1  | -               | - | -      | - | -      | - | -      | - |
| G3    | LaSota                  | LaSota  | -               | - | -      | - | -      | - | -      | - |
| G4    | Control                 | -   | -               | - | -      | - | +      | + | +      | + |

T = Trachea, C = Vent, DAC = Days after challenge, + = positive isolation, - = negative isolation

SPF chicks began to present clinical signs such as ruffled feathers, anorexia, depression, conjunctivitis, dyspnea, respiratory disorders, severe and green diarrhea and death. At necropsy, were observed necrotic lesions in the trachea accompanied by catarrhal exudate in the lumen, petechial hemorrhages in the proventriculus and hemorrhages in the small intestine and cecal tonsils. NDV was isolated from these SPF chicks, indicating the ability of the NDV used in this trial to cause disease.

Table 3 shows the results of viral isolation. The NDV was isolated from Pekin ducks of the control group (non-vaccinated against ND – G4 group) at 20 and 30 days after challenge. This confirms the susceptibility of this species to the NDV, as demonstrated by REIS; NÓBREGA (1956). This data demonstrates that white Pekin ducks are able to eliminate the NDV from 20 up to 30 days after infection, which is very important for the epidemiology of this disease.

Unfortunately, there is no information about the importance of white Pekin ducks as NDV carrier, or as to the potential risk factor of the dissemination of the Newcastle disease by Pekin ducks to other food-producing poultry, such as turkeys, broilers, breeders and layers, that may be raised close to the Pekin duck habitat. In contrast, the NDV was not isolated from groups of Pekin ducks that were vaccinated against the NDV. It suggests that vaccination can efficiently eradicate this virus in Pekin ducks and can be an important tool for the epidemiological control of NDV dissemination to other poultry species. Further studies should be developed to establish the importance of white Pekin ducks as NDV carrier, disseminating the disease in the field.

## CONCLUSIONS

1. White Pekin ducks showed to be resistant to the development of clinical signs of ND when challenged with velogenic NDV.

2. It was demonstrated, in the epidemiology of the NDV, the relevance of white Pekin ducks that can eliminate the virus from 20 to 30 days after challenge.

3. Vaccination against ND is important to prevent the elimination of the virus in the field.

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